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Project DTRS56-06-T-0003

Pipeline failures from stress corrosion cracking (SCC) remain a major safety concern among pipeline operators. To manage the safety threat from SCC, the operators require key information to assist in identifying the potential and the location(s) on the pipeline system for this threat, assess and characterize the threat, and determine the appropriate mitigation measures.

In spite of many efforts at developing reliable sizing techniques for stress corrosion cracks, current methods are either very expensive and time consuming or unreliable. The development of a reliable nondestructive technique would be very desirable.

The objective of this project is to apply the proven technologies of laser ultrasonics and finite difference modeling to the important problem of depth measurement of stress corrosion cracks. Laser ultrasonics offers a number of significant benefits for the sizing of SCCs including small footprint on the pipe, rapid scanning and high bandwidth. Laser generation produces a rich admixture of ultrasonic waves, covering many wave types, directions and frequencies. Finite difference modeling offers a very promising pathway to harnessing these waves for effective crack depth measurement. Team members for this project are Lasson Technologies, Inc. and RTD Quality Services (QS) LLP. Cost share is provided by RTD QS through its affiliated companies, Pipeline Research Council International (PRCI) and individual pipeline companies.

In the second quarter we focused on three efforts: (1) transfer of modeling results for guiding laboratory experiments, (2) testing on isolated cracks and (3) extending the model to complex cracks. All the above efforts were completed. In the third quarter we will continue the finite difference simulations for colonies of cracks and will continue to optimize the laser ultrasonic beam configuration, as guided by the simulation results.

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